## A Toast To Wetlands!

For most Albertans, the word **wetland** brings a certain image to mind. Some may picture a beaver quietly going about its work of building a lodge, or a flock of Canada geese feeding in a field on a crisp fall morning. Others may imagine areas that are obstacles for their tractor or truck. The different attitudes towards wetlands are as great as the functions and values wetlands provide. Some attitudes have changed over time and with those changes have come exciting opportunities for wetland management in Alberta!

**Wetland** – An area where the land is saturated with water long enough to have poorly drained soils, water-loving plants and biological processes suited to wet areas.

## Wetlands Of Alberta

Wetlands are a halfway world between water and land **ecosystems** and have some characteristics of both. Because wetland characteristics can range from aquatic (water) to terrestrial (land), there is no single, universally recognized definition of a wetland. In Alberta, wetlands are generally defined as areas where the land is saturated with water long enough to have poorly-drained soils. They contain water-loving plants and biological processes suited to wet areas. Wetlands neither occur nor function in isolation; rather, they are part of a larger working ecosystem. The lands surrounding wetlands are vital to their functioning and health.

**Ecosystem** – A system of interacting living (animals, plants, insects etc.) and non-living (rocks, air etc.) components in a particular environment (e.g. marsh).

Lakes are not considered to be wetlands. To be a lake, a body of water must have well defined beds and banks, be permanent and be fairly deep. Shallow water that is next to lakeshores (e.g. at inlets/outlets or shallow bays) or next to stream or river flood plains that are regularly flooded may support wetland communities since they have all of the necessary conditions to be defined as a wetland. But lakes and rivers themselves, by true definition, are not wetlands.

Wetlands often occur in depressions, or low areas, where the ground is saturated with water or is flooded for a period of time. Wetlands are found throughout Alberta. In fact, approximately 21 per cent of Alberta is covered by wetlands. Most are on public land, but some are on private land, Indian Reserves and Metis

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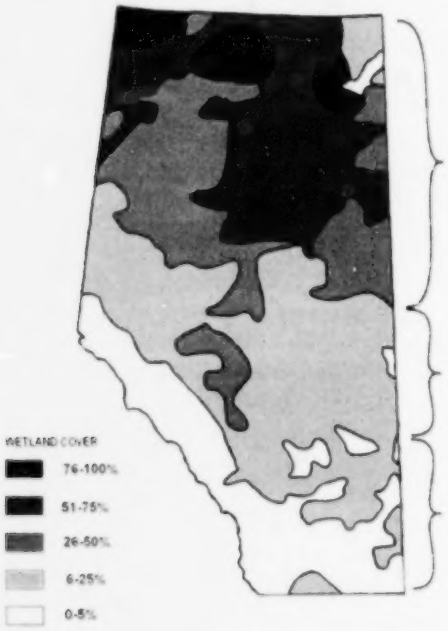
Settlements. Traveling northward from the Alberta - Montana border, you will see an increasing number of wetlands. The greatest number of wetlands in the province is in northern Alberta; most of these are **permanent** wetlands, holding water year-round. There are fewer permanent wetlands in central and southern Alberta. In these areas, wetlands are usually **temporary**, holding water only in the spring, or **semi-permanent**, holding water most years, but not all. Climate, land features, surface and **groundwater** flow, vegetation and soils determine the type and extent of wetlands.

The map below is a simplified version of wetland distribution in Alberta. A number of factors such as seasonal water levels, wetland size, climatic variability, the temporary nature of some wetlands and seasonal and yearly land uses make it difficult to have a completely accurate map.




**Wetlands in Alberta** The darker the shading, the more wetland cover on the ground.

Primarily **Bogs** and **Fens** in the Boreal Forest

Primarily **Permanent** and **Semi-permanent** Ponds and Marshes

Primarily **Semi-permanent** and **Temporary** Ponds and Marshes

## Alberta Wetland Types at a Glance

There are many different types of wetlands, each with its own characteristics. Generally, wetlands are divided into **peatlands** and non-peatlands. Peatlands cover approximately 93 per cent of the total wetland area in Alberta. Peat is the remains of partially decomposed plants such as **sedges** and **grasses**, but primarily **mosses** that pile up in deep layers over many years. Sphagnum moss is the most abundant material we find in peat. Peat accumulates in wetlands known as bogs and fens. Because peat does not accumulate to a significant thickness in slough/marsh areas or in shallow water, these areas are defined as non-peatlands. Peatlands and non-peatlands are general terms to describe wetlands. In Alberta, these general terms are further divided into specific types of wetlands.

**Permanent wetland** A wetland that holds water year-round.

**Temporary wetland** A wetland that exists usually during spring run-off, but tends to dry up in summer.

**Semi-permanent wetland** – A wetland that tends to dry up in dry years, and holds water in other years.

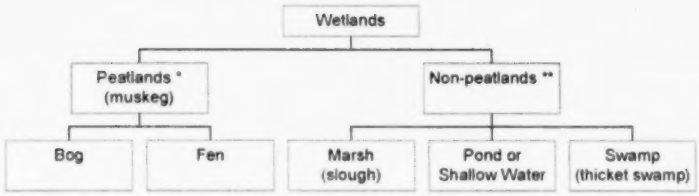
**Groundwater** – The water below the ground, below the **water table**, contained in empty spaces (pore spaces between rock and soil particles, or bedrock fractures).

**Peatland** – A general term used to describe wetlands that contain a build-up of peat and have relatively high, stable water tables. Commonly referred to as **muskeg**, peatlands includes both bogs and fens.

**Sedge** – A plant with a triangular-shaped, solid stem that grows in wet areas.

**Grass** – A plant with a hollow, cylindrical-shaped stem; grows in drier areas.

**Moss** – *a* flowerless, rootless plant that grows in wet areas




* Confined to cooler, wetter areas in northern and western Alberta.
** Can be found throughout Alberta.

## Bogs

Bogs are wetlands that form in cool, wet areas where drainage is poor and the soil lacks oxygen; they are mostly found in northern and western Alberta. Rain and snowfall supply most of the water to a bog, which is why bogs are low in nutrients. Bogs are also strongly acidic, partly due to the mosses and trees that grow there. A carpet of sedges and mosses – usually sphagnum moss – covers bogs with colors from pale green to dark red. Black spruce is the dominant tree, easily recognized by its dark colour and "scruffy" appearance. A bog can look like a forest that is not growing! Other trees such as tamarack (larch) and bog birch, as well as plants such as cloudberry, bog laurel, and Labrador tea are adapted to grow in bogs. Some plants in a bog need more nutrients than the bog can supply, like the **carnivorous** sundew and pitcher plants.

Each autumn, mosses die and leaves fall. This organic matter will partially decompose, and accumulate in layers in the bog. The cool temperatures and lack of oxygen prevent this organic matter from fully decomposing, as it might on a warm, dry field. Instead, this partially decomposed material, called **peat**, builds up slowly over time at a rate of about 1-cm every 100 years. Holding ten to twenty times its own weight in water, peat acts like a sponge on the landscape. When you walk in a bog, it is rare to see surface water, but when you step, water will squeeze out of the peat and mosses. These water-holding properties make peat ideal for gardening purposes, as well as being a natural way of storing water on the landscape.

## Fens

Fens are also peatlands, but receive their water supply mainly from groundwater. Therefore, water in a fen is less acidic and contains more nutrients than water in a bog. The **water table** is usually at ground level. Although the dominant plants are sedges, grasses and brown mosses, flowers such as irises are also present. Though some fens may look like open fields of sedges or grasses, others have a covering of black spruce and tamarack (larch), as well as some shrubs. This appearance can be deceiving; the layer of peat can become a "floating mat" that may or may not be strong enough to support one's weight, dropping you into the groundwater below! Often it is difficult to visually distinguish between bogs and fens. An understanding of the water source and water chemistry is sometimes needed to tell the difference between these two types of peatlands. Both, however, are important for moisture retention in Alberta.

**Carnivorous** – A plant that receives most of its nutrients by ingesting insects.

**Peat** – Partially decomposed organic matter that builds up in a peatland (bog or fen).

**Water table** – The upper level of groundwater; the level below which the pore spaces in the soil or rock are saturated with water. In most places the water table is below ground. However, the surface of lakes and some wetlands are areas where the water table is at ground level.

## Marshes

Marshes are formed in depressions in the landscape where water collects as standing pools. Water comes from run-off, precipitation and, for some marshes, groundwater. **Slough** is a local term for *marsh* in western Canada. Many **emergent** plants are seen in abundance in marshes. Emergent plants include cattails, rushes and reeds. Most of these plants are adapted for high and low water levels so that if the marsh dries out, the plants will become dormant until growing conditions are suitable again. Grassy meadows, willows and shrubs often border marshes. This border of vegetation in the **riparian** area is critical for a healthy marsh. Small marshes in the rolling hills of the prairies are also known as potholes. These pothole depressions were left behind by glaciers and are generally isolated from other marshes by higher ground. Marshes can cover large areas or be fairly small and isolated.

## Ponds or Shallow Water

Ponds, or shallow waters, are wide, flat basins of standing water. In mid-summer the water usually measures two metres or less, although it can be deeper. Sometimes the water dries up temporarily, but usually you will find water in these wetlands, even in summer. Ponds are also called pools or shallow lakes. They receive water from run-off, rain, snow, or underground sources.

## Swamps

Swamps are forested wetlands that are flooded seasonally by standing or slow-moving water and are dominated by trees and shrubs. Swamps are not common in Alberta and are usually confined to the **transition zone** between peatlands and **upland** forests. Swamps are sometimes referred to as forested wetlands since they have a dense cover of both **deciduous** and **coniferous** trees. Swamps with tall shrubs such as willow, dogwood and alder are called thicket swamps. Many wetlands are incorrectly referred to as swamps. True swamps are more common in warmer climates, such as the Carolinian forest in Southern Ontario, or the Everglades in Florida, where certain tree species are well adapted to grow in deep water.

## Importance Of Wetlands

Wetlands are among the most fertile and productive ecosystems on earth. In the grand scheme of things, it was the swampy wetland environment of many millions of years ago that was home to the earth's earliest life forms. These areas acted as catchment areas that preserved and produced many of the fossil fuels on which we now depend. Alberta's coal and petroleum industries bring these areas to life millions of years later!

In more recent times, we have begun to value wetlands for the immediate functions and values they provide. The functions depend on the location of the wetland, its surrounding landscape, sub-surface geology, **hydrology**, and the types of living organisms present. While each wetland may not perform all

**Slough** – a "local" term, used interchangeably with "swampland", often to refer to any wet area – marsh, pond, puddle, etc.

**Emergent** – Plants that are rooted under water, but are visible above water. i.e. cattail, bulrush

**Riparian** – the bank of a wet area – could be a wetland, lake or river. It is the area between the water and drier upland. Willows and other plants and shrubs that require, and can withstand, a lot of moisture, grow there.

**Transition zone** – The area of land that marks a change between two specific ecosystems. This zone shows characteristics of both ecosystems.

**Upland** – Higher ground, which drains onto land that is lower than it (like wetlands).

**Deciduous** – A tree that loses its leaves or needles each fall i.e. poplar, tamarack.

**Coniferous** – A tree that bears its seeds in cones i.e. spruce, pine, tamarack trees.

**Hydrology** – the science of the properties, distribution and movement of water on the surface of the land, in the soil and in the atmosphere.

functions, the combined value of all the wetlands in a **watershed** makes each wetland important. Wetlands are valued for a variety of functions:

- hydrology
- life support
- water quality
- economic benefits
- social/heritage benefits

**Watershed** – An area bounded by a height of land that *sheds* water into particular watercourses (rivers, streams, creeks etc.) and waterbodies

## Hydrology

Wetlands are an important part of the *hydrologic* (water) cycle, where water falls to the earth's surface as rain and snow and then evaporates into the air to fall once again as precipitation, or finds its way into the groundwater. As this cycle repeats itself, wetlands contribute to storing and controlling surface water and to **recharging** and **discharging** groundwater.

**Recharge** – The slow release of water from the wetland into the underground soil and rock. Groundwater is recharged by wetlands that are higher than the water table.

Wetlands are natural **reservoirs** of water, often supplying water for human, agricultural, industrial and environmental use. In times of flooding, wetlands slow water flows, thus reducing flooding. Wetlands store this water, releasing it during dry periods, or droughts. Water stored in wetlands contributes to recharging and maintaining water table levels in some areas. For example, in winter and spring, the abundant water in prairie marshes may recharge the groundwater. In the drier summer months, groundwater may be discharged into the wetland system, keeping water at the surface and available for use. In bogs, sphagnum moss and peat can hold up to 20 times its weight in water!

**Discharge** – The flow of water from the water table into the wetland. Discharge may come from ground water, a lake or surface runoff. Discharge occurs when the water table is as high as, or higher than, the wetland.

There are many on-farm advantages to wetlands. Evaporation and **transpiration** provide a source of water to the atmosphere, which creates local cloud formation and rain. This local precipitation is often an important source of moisture for the prairies. Rainwater then seeps into the ground and recharges the groundwater and well water supplies, or is useful for irrigation and livestock watering. By pooling water and slowing the flow of runoff, wetlands reduce soil movement (erosion) and in some situations, reduce the amount of downstream flooding. The water stored in a wetland also contributes to increased soil moisture in the wetland's riparian area. In some situations, this extra soil moisture can increase crop yields.

**Reservoir** – Place that holds water; more often used to describe constructed (unnatural) wetlands.

**Transpiration** – the release of water vapour from plants and trees.

## Life Support

Having both aquatic and terrestrial characteristics, wetlands provide diverse habitat (food, water, shelter and space) for many wildlife species. Wetlands are crucial for maintaining many species at risk, including the peregrine falcon, piping plover, whooping crane and northern leopard frog, to name a few.

Studies have shown that 158 species of birds depend on wetland environments in Alberta for some part of their life cycle. Many other species, though not wholly dependent on wetlands, use these areas for feeding, nesting or cover. In total, Alberta's wetlands are used by about 250 species of birds. The Peace-Athabasca Delta is an internationally recognized wetland. Many thousands of ducks, geese

and swans migrate from the United States along the Central and Mississippi flyways to this area to breed. The whooping crane is one of the endangered species that travels to the Delta to breed.

Temporary ponds are particularly important for female ducks since they provide them with ideal nutritional requirements. These shallow wetlands warm up quickly in the spring sun and are repeatedly being flooded and dried out. Plants decompose quickly and provide nutrients for many **invertebrate** populations. Ducks feed heavily on the invertebrates.

**Invertebrate** – An animal that doesn't have a backbone. Insects, snails and worms fall into this category.

A variety of other animals also depend on Alberta wetlands: 17 species of mammals and 15 species of amphibians and reptiles must have wetland habitat to survive. A total of 44 fur bearing species such as mink, beaver and muskrat, as well as larger mammals like deer and moose use wetlands. The Peace-Athabasca Delta alone supports 42 species of mammals, including the wood bison, an at-risk species that grazes on the meadows of the Delta's wetlands.

Many species of wildlife that do not use wetlands directly feed on life produced in the wetlands. For example, predators such as the peregrine falcon, bald eagle, coyote and fox feed on birds, ducks, fish and other wetland wildlife.

Many species of fish depend on wetlands. A total of 22 species meet their needs in these areas. Larger lakes (not wetlands!) provide excellent habitat for some, while seasonal, shallow wetlands that are connected to lakes offer spawning and rearing grounds for others. Wetlands often supply food, nutrients, and even water to adjacent lakes and rivers.

Wetlands support a great diversity of plant species. The parkland and prairie wetlands of Alberta support over 21 rare plants. One of these, the western blue flag, is an at-risk species found in southwest Alberta. Many rare plant species of the wetlands are small and hard to see. Because they are seldom noticed or studied, information about them is scarce.

The lands immediately surrounding wetlands, called riparian areas, are often lush from moisture released by the wetlands. Riparian areas are habitat for species to nest, den, or feed, providing cover and shelter from predators.

### Water Quality

Water quality in Alberta is directly and indirectly affected by wetlands. Wetlands help to filter sediment, absorb nutrients, remove chemical residues, and treat wastewater. Wetland vegetation such as cattails can take up and store nutrients and toxins. Some scientists have called wetlands "nature's kidneys" because they perform these filtering functions.

Vegetation in the riparian area and in the wetland helps to trap sediments, preventing eroding soil from filling in the wetland. The vegetation and still water also allows suspended solids to settle, preventing sediments from being carried further into water systems, like rivers and streams.

Water that is too rich in nutrients will promote the growth of algae. When algae die, much of the oxygen dissolved in the water is used to decompose the dead

algae. This robs other organisms of the oxygen they need. Contamination by nutrients is of particular concern in agricultural and municipal areas where phosphorus and nitrogen from fertilizers applied to fields and lawns can find their way into water systems. By absorbing such nutrients, wetlands contain them in one spot, preventing nutrients from reaching rivers and lakes where algae can also be a problem.

Wetland vegetation can remove some chemicals from water and microorganisms can break down harmful sediments. Pesticides, pulp mill wastewater, oil, gas and mineral extraction processes all generate wastewater pollutants in Alberta. Wetlands can be constructed and seeded with natural plants to help cleanse and purify the wastewater from some of these sources.

In Alberta, some wetlands have been designed to treat wastewater. The size of the wetland and the abundance and type of plants will determine the amount of wastewater they can effectively treat. Many **sewage lagoons** become artificial wetlands (bulrushes and cattails grow, and ducks nest) even though that was not the original intent. Some wetlands may be used as treatment areas for storm drain runoff. However, this does not mean that we should dump trash or waste into wetlands and assume it will be cleaned up! While wetlands can be one method to help clean wastewater, we cannot rely on them to solve our waste problems. As natural systems, there are limits to what and how much they can neutralize.

**Sewage lagoon** – Place that holds and treats wastewater, usually next to an urban center or facility that produces wastewater.

## Economic Benefits

Forage crop production, peat extraction, tourism and other related industries all benefit from wetlands. Waterfowl and animals of the wetlands support important fishing, hunting and trapping industries in Alberta. Millions of dollars are generated from hunting, guiding, buying equipment, transportation, accommodation and other associated activities. The sale of down from waterfowl and the taxidermy industry add to the total. Beaver, muskrat, otter and mink are the most abundant wetland species that are trapped, while other animals are hunted.

Wetlands provide an excellent environment for growing some **forage** crops, even in times of drought. Moisture is slowly released, providing good growth around the edge of the wetland. In the heat of summer, forage from dry pasture areas declines while hay cut from wetlands and their margins offer nutrition for livestock. Some wetlands in northern Alberta are suitable for growing wild rice.

**Forage** – Crops that are grown for the purpose of supplying food to cattle and other domestic animals, like horses.

The peat industry also contributes to the provincial economy. The 12.6 million hectares of peatlands in this province make up 92 per cent of the total wetland area. The many uses for peat, from gardening to binding and filtering oil to use in cosmetics and hygiene products, bring significant economic benefits to Alberta.

Other economic benefits from wetlands come from products we may not consider. For example, some animal and plant species are collected for research or sold for use in hobbies, crafts, medicines, bait, and chemical manufacturing.

Seeing wetland areas close-up promotes non-consumptive recreation such as photography and wildlife viewing. In 1996, Albertans spent around $171 million

to photograph, watch and study wildlife. In fact, bird watching is the largest growing hobby in North America!

Wetlands offer indirect economic benefits, too. Wetlands can reduce expenses associated with maintaining water quality. With the capacity to control flooding, wetlands can reduce the need for infrastructure like culverts and drains needed for flood control. Indeed, these abilities make wetlands a very valuable resource.

### Social/Heritage Benefits

Wherever the wetland is and whatever its size, people travel to wetlands for an interesting experience in stimulating surroundings. Albertans visit bogs and marshes to walk, hike, bird-watch, picnic and relax in the quiet atmosphere. For both rural and urban dwellers, having a wetland nearby can offer a diverse, natural environment in which to enjoy a rich variety of plants, animals, fish and birds.

Wetlands are also places for scientific research. Climate change, nutrient cycling, pesticide contamination, heavy metal absorption and species monitoring are some of the kinds of research being conducted in wetland areas. Albertans can voluntarily monitor amphibian populations – a great way to enjoy wetlands while helping scientists! (See end of this article for more information.)

The educational value of wetlands is outstanding. Studies range from ones done by elementary classes to those done by ecologists and soil scientists. They are unique and important places to experience.

### Wetlands Today

With all these functions and values, we might expect wetlands to be valued and conserved by society. This, however, has not been the case. Wetlands in Alberta are disappearing at an alarming rate. In the Parkland region of the province alone, an estimated 60 per cent of the wetland area has disappeared since the beginning of the 20th century.

In the past few decades, we have discovered the many functions and values of wetlands and the focus is shifting to managing human activities so both wetlands and people can benefit. Local, national and international organizations are attempting to turn the losses of wetlands around. In Alberta, some wetlands are being protected and restored by the Alberta NAWMP Partnership (ANP). This program works to improve and expand waterfowl habitat under the North American Waterfowl Management Plan (NAWMP). Made up of Canada, the United States and Mexico, NAWMP is taking action to protect more than 2.4 million hectares of wetland on the continent. Here on the Canadian prairies, NAWMP proposes to protect or enhance 1.5 million hectares of waterfowl habitat in Manitoba, Saskatchewan and Alberta.

Ducks Unlimited Canada, Nature Conservancy of Canada, and Alberta Environment are working with Alberta landowners to set aside wetland parcels suitable for restoring or developing wildlife habitat. Land is leased or purchased in some cases, or land is left in production and the farming practices are changed

in order to support wildlife. For example, the owner may delay haying or grow alternative crops. Individuals as well as public and private organizations are working together to preserve these productive ecosystems. Cooperation is crucial!

### Wetlands At Risk

Drainage for agricultural purposes is the main reason for wetland losses. Reduced wetlands means farmers have more land for producing crops and less waterfowl on their property, reducing crop loss. Drainage allows farmers to move their equipment onto the fields earlier in spring, and it can eliminate a source of weeds. The agricultural community recognizes the importance of having natural water storage areas on their land, and is beginning to understand how wetlands can influence local weather patterns, like increasing local precipitation!

Other activities that contribute to wetland loss in Alberta include peat extraction, timber production, oil and gas development and water contamination. The weather can also play a role. Many dry years in a row can reduce the number and size of wetlands, making them susceptible to development when dry for too long. If development occurs, flooding and erosion can become a problem.

As cities and towns grow, housing, shopping and industrial areas expand, often draining and filling in wetland areas. Nearby wetlands are drained to eliminate populations of biting insects that breed there, and to make life more comfortable for people in urban centres. Wetlands become convenient disposal spots by people who deem them as "wastelands." Road development in the province has also eliminated many wetland areas. Roughly 75 per cent of the wetlands around Calgary and Edmonton were eliminated by 1966. Even when roads are built some distance away from a wetland, the development can disrupt or block the natural filling and draining of water into the wetland.

### Now And Into The Future

With cooperation and determination, we can manage human activities to protect wetlands. Because wetlands are often on private land, it is important that landowners are educated and involved in making decisions to benefit both people and the wetlands. The benefits offered by wetlands go far beyond the borders of the landowners' property lines!

Albertans are now facing the challenge of deciding what the social, aesthetic and economic costs will be to future generations if we continue to degrade and destroy wetlands. It is difficult to put a price tag on the value of the natural environment. However, people are quickly realizing the value of a good quality and ready supply of water. It is difficult to assess the value of the opportunity to spend time in a diverse and beautiful natural setting among the plants and animals, insects and fish that depend on this environment. Without this opportunity, the loss might be realized, but by then it may be too late. Valuing and conserving wetlands can be a difficult task in the face of regional economic demands. That is why it is so important for people to realize that a loss of wetlands can lead to environmental problems surrounding the health of water, our land, wildlife and us.

In Alberta a Wetland **Policy** is being developed to address wetlands on public and private lands. The Policy states that when development occurs on public lands, there must be no net loss of wetlands. For example, if a wetland is to be drained for highway construction, a new wetland must be constructed nearby. Likewise, all water in Alberta, whether on public or private land, is the property of the Crown. Disturbances to any water body, including wetlands, require that an approval be obtained from Alberta Environment before any work begins.

**Policy** – A set of guidelines that helps to manage a particular issue or development.

By accumulating data on the value of wetlands and presenting awareness campaigns, many organizations are helping to inform the public about the importance of Alberta's wetlands. Urban centers are developing their own wetland policies. The goal is for more people to appreciate wetlands and see that their own conservation efforts are part of the solution. Wetland management, conservation and preservation are tasks in which everyone can, and should, be involved.

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For information about *Alberta's Amphibian Monitoring Program,* see http://www3.gov.ab.ca/srd/fw/riskspecies/ or call (780) 422-4764.

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